ARTHUR BROWN

Owing to the special nature of railroad bridges, and to a certain extent railroad buildings of various kinds, it is customary to place one man in charge of these structures. To him is delegated the preparation of plans and also the supervision of construction in the field. On the Central Pacific, Arthur Brown occupied that position during the building of the major portion of the line, so that when the unusual problem of the snow sheds in the higher reaches of the Sierra Nevada was encountered, it was he, as superintendent of bridges and buildings, who designed and superintended the work.

Arthur Brown was born at the village of Kentore near Aberdeen in Scotland, in 1830. Like many another of that wandering race, he was brought to Canada as a child by his widowed mother. There he lived at Ottawa with his family, securing such primary education as was then available.

When a young man, he was engaged with an uncle, Alexander Christie, in railroad construction of bridges and culverts. Coming west with his uncle to the Fraser River country, young Brown took a contract for a pier at Victoria, British Columbia. Then in 1864 he journeyed south to California, and in 1865 obtained work on the Central Pacific under Strobridge, with whom he remained one month. He was then placed in charge of bridges and buildings, continuing in that position until the road was completed. One of his most noteworthy achievements was his rebuilding of the bridge over the American River forty hours after it was burned.

Brown remained with the railroad and its successor organizations until the early 1890's, during which time a large portion of the Southern Pacific System was built. In addition to being responsible

for buildings and bridges, he was called upon to construct the elaborate mansions of Stanford and Crocker on Nob Hill in San Francisco, as well as the original Del Monte Hotel at Monterey.

Arthur Brown was married to Victoria Runyon in 1870. He Died on March 7, 1917, at the age of eighty-seven years, having long outlived most of the men with whom he was associated in the building of the Central Pacific Railroad.

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Pages 90-91, "The First Transcontinental Railroad" by John D. Galloway

Page 86 of the same volume also makes this note:

"In accordance with your request I am giving you my recollations of J. H. Strobridge, Superintendent of Construction during the building of the Central Pacific and later of the Southern Pacific and other subsidiaries of the Central.

I first became acquainted with Mr. Strobridge about 1883 when work was begun on the extension into Oregon, north of Redding. Mr. Strobridge was in complete charge of all grading and track-laying forces. Incidentally, I might mention that Mr. Arthur Brown was in charge of all timber and bridge work and his duty was done so as not to cause delay to the grading and track laying.

The outfit that began working at Redding had just finished building the line from Mojave to Needles, and previous to that had completed the Southern Pacific to Texas.

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Exhibit No.11 - Statement of Arthur Brown, Superintendent of Bridges and buildings, relative to cost of construction.

West Oakland, Cal., July 25, 1887.

Hon. Leland Stanford,
President, Central Pacific Railroad Company:

Dear Sir:

In reply to your letter of the 23rd inst., I herewith submit a brief outline of the construction of the snow sheds over the Sierra Nevada Mountains, on the line of the Central Pacific Railroad, as well as the conditions which made them a necessity.

As superintendent of bridges and buildings the work of constructing those sheds was assigned to myself. The excessive snow belt where the road crosses the Sierra Nevada Mountains, extends from a point near Blue Canon, on the western slope, to Cold Stream Canon on the east, a distance of about 40 miles, having its maximum depth near the summit. The snowfall for the season has been known from actual measurement to be nearly 50 feet.

In the fall of 1866 the road was opened to Cisco. The experience in keeping the road open through the following winter led to the construction of the snow sheds. Although every known appliance was used to keep the road clear from snow that winter, including the largest and best snow plows then known, it was found impossible to keep it open over half the time, and that mostly by means of men and shovels, which required an army of men on hand all the time at great

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expense.

It became evident from our experience then that the snow problem had become serious, and it was decided, after various discussions on the subject by the directors of the company, that the only positive means of protecting the road was by snow sheds and galleries, although the expense of building a shed nearly 40 miles in length was almost appalling and unprecedented in railroad construction, yet there seemed to be no alternative but build the sheds. I was therefore instructed to make preparations and plans for such sheds as was deemed best, from our limited experience at that time.

In the summer of 1867 we built some experimental sheds, which we had to modify considerably. The snow-shed building in the spring of 1868 was commenced in earnest. Owing to the short season in which the work had to be done (less than five months) it was decided to cover all the cuts and the points where the roads crossed the great avalances beyond the summit, with the idea that the high embankments on the road could be kept clear of snow.

As the road was then rapidly progressing up the valley of the Humboldt it became a matter of the most vital importance that the sheds should be so far finished that the supplies and building materials for construction ahead should not be interrupted, as the connection was to be made in the spring of 1869. We

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therefore had to gather men from all quarters and pay high wages - carpenters $4 per day, and suitable laborers about $2.50 to $3. We employed about 2500 men, with six trains with locomotives distributing material.

The expense was considerably increased by the fact that we had to keep the road clear for the traffic, which was great, owing to the large amount of building material forwarded to the front, and to avoid accident, which consumed about 30 per cent. of the time, consequently increasing the cost in that proportion, besides, we had, by commencing early in the spring, to shoval from 6 to 8 feet of snow before we could put in foundations for sheds.

In the fall we continued until the snow stopped us entirely, although we had been shoveling snow for nearly two months. The expense from the amount of snow that had to be shoveled, spring and fall, and the difficulty of getting men at reasonable wages to remain on the work owing to snow, bad weather, etc., added very much to the cost. As there were not enough saw-mills to supply the necessary material, we had to resort to round and hewn timber, which had to be got from the woods and brought to the track at a great expense, as suitable men for that purpose were very scarce.

The galleries are built along the side of the mountains, where the slope of the roof conforms with that of the mountain, so the snow can pass over easily. Some of those galleries run back on the slope

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of the mountain several hundred feet from the center line of the road. In other places massive masonry walls were built across ravines to prevent the snow from striking the sheds at right angles. The snow sheds and galleries were finished in the fall of 1869. In them was used 65,000,000 feet, B.M., of timber, and 900 tons of bolts and spikes, etc. The total length of sheds and galleries when finished was about 37 miles, at a cost of over $2,000,000.

For several years the loss from fires was considerable, as several miles were burned down and had to be rebuilt, and at the present time water trains are constantly kept on hand for sprinkling down the sheds twice a week, thus preventing their destruction by fire. A number of the tunnels through the same mountains had to be timbered at a great expense, as most of it had to be got out in the winter time, and, as it was impossible to keep the roads open, we had to employ men and bring timber to the tunnels on hand sleds.

I am quite familiar with the extraordinary exertions put forth in all departments of this work, as I was constantly on the ground during all this construction, and especially the almost superhuman effort put forth by Mr. J. H. Strobridge, superintendent of construction, in keeping the men at work on the rock work and tunnels, and shoveling snow at great depth during the fall and winter, and contending against mud

and snow in getting supplies to the ground at great expense.

I consider, from my experience, that if time could have beenspared to take advantage of the proper seasons, it could probably be duplicated now for less than 40 per cent. of its original cost.

Very respectfully,

ARTHUR BROWN,
Supt.B.and B.Dept.

Pages 159-160, "Collis P. Huntington" by Evans

The greatest difficulty in the construction of the railroad through the Sierra was undoubtedly the snow. The snowfalls were so frequent and so heavy that as soon as the grading line and tracks were uncovered after a storm, another would bury them deeper than before. In addition to the shoveling by an army of workmen, every known appliance had been used including the largest and strongest snow plow, weighing nineteen tons, and requiring sixteen engines to operate.

In 1867, after many discussions on the subject, the directors decided that the only positive means of protecting the road was by snow sheds, literally houses built over the tracks. The work was put in charge of Arthur Brown, superintendent of the company's buildings and bridges, who had this to say on the subject:

"The expense of building a snow shed nearly forty miles in length was appalling and unprecedented in railroad construction. In the summer of 1867 we built some experimental sheds which we had to modify considerably. We commenced in earnest in the spring of 1868. We had to gather men from all quarters and pay high wages--carpenters, $4.00 a day, and suitable laborers from $2.50 to $3.00. We employed about twenty-five hundred men and had six trains with locomotives to distribute material. There were not enough sawmills to furnish the lumber required and the builders had to use round timbers for a large part of the work. This was more costly and more difficult because axmen in those days were very scarce, and the timbers had to be brought over the snow at great expense.

Two types of construction were adopted: the shed for localities where the weight of the snow had to be supported, and the gallery for such places as were exposed to the terrible avalanches of snow

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to be put up, and we had to dig a hole in the snow 16 feet deep for the purpose of laying the timbers on the ground.

"For bridge timber we paid from $18 to $25 a thousand, snow shed timber from $13 to $15 a thousand.

"Greatest difficulty in building snow sheds. 1868, summer before road open, everything depended on having road covered. Had 2,500 men at work. Teams hauling timber and five or six trains. We worked on late in the fall shoveling snow. Succeeded in getting road covered so they could take material over the road that winter. Finished up in spring of 1869.

"On the east side of the summit of the Sierra Nevadas where the snow lay in drifts 80 feet deep, impossible build snow sheds. Under such pressure best selected timber of the mountains snapped. Sheds were crushed in, requiring constant shoveling of snow during remainder of winter. It was therefore decided to build heavy retaining walls and to fill in the back of the wall with rock and other convenient material, forming a slope or incline about equal to that of the mountainside." Extracts 3602-04

See 3609. Stanford testimony.

and ice from the steep and rocky slopes. Some of these galleries extend back up the slope of the mountain several hundred feet from the center line of the road, and in other places massive masonry walls were built across ravines to prevent the snow from striking the sheds at right angles. It was necessary to build the sheds and galleries of enormous strength by bracing them against the mountain side, framing them and interlacing them with beams and cross beams. The expense was considerably increased by the necessity of keeping the road clear for traffic and to forward large amounts of building material to the front. The sheds and galleries were finished in the fall of 1869. In them were used 65,000,000 board feet of timber and nine hundred tons of bolts and spikes. The total length was about thirty-seven miles and the cost was over $2,000,000."

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Page 139 "The Big Four" by Oscar Lewis

Early in March, 1878, Hopkins hobbled aboard a company train bound on an inspection tour over the new Sunset Route. He has a theory that the hot Arizona sun would bake the stiffness out of his joints and enable him to hurry back to his accounts. Secure in that belief, he stretched himself one evening on a couch in the car on a Yuma siding and dropped off to sleep. Presently one of the company's construction engineers, Arthur Brown stepped across

to arouse him. But for once Uncle Mark was not concerned with being punctual. He had died a few months short of 65.